UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION 5
77 WEST JACKSON BOULEVARD
CHICAGO, IL 60604-3590

March 22, 2016

REPLY TO THE ATTENTION OF:
LU-9J

Via Certified Mail 7014 2870 0001 9579 4644
Return Receipt Requested

Keith Nagel, General Manager
Environmental Affairs and Real Estate
ArcelorMittal Indiana Harbor LLC West
3001 Dickey Road
East Chicago, Indiana 46312

Re: Former Coke Plant Area, Pre-Design Work Plan
ArcelorMittal Indiana Harbor LLC West (ArcelorMittal West) facility, East Chicago, Indiana
RCRA Docket No. R3013-5-03-002; EPA Facility ID IND 005 462 601

Dear Mr. Nagel:

EPA has reviewed ArcelorMittal's submission dated November 30, 2015, for the Former Coke Plant Area, Pre-Design Work Plan Report for the ArcelorMittal Indiana Harbor LLC West Mill (ArcelorMittal West) facility in East Chicago, Indiana. EPA's review focused on technical adequacy and consistency with Agency policy, and the Report for the Former Coke Plant Area, Revision 1, approved with modifications by the EPA on February 16, 2016.

EPA comments on the Pre-Design Work Plan are contained in the Enclosure to this letter. EPA requests that you review the comments and submit a response to EPA, along with an amended Work Plan, within the next 30 days. In the interim, if you have any questions regarding this letter, please contact me at 312-886-6760.

Sincerely,

Michael Mikulka, P.E.
Senior Environmental Engineer
Remediation & Reuse Branch
Land & Chemicals Division

Enclosure

cc: Thomas Barnett, Environmental Manager, ArcelorMittal East Chicago
Cary Mathias, ArcelorMittal USA Cleveland
Jeanne Tarvin, Ramboll Environ, Milwaukee
Mike Sickels, IDEM

TECHNICAL REVIEW
NOVEMBER 2015 PRE-DESIGN WORK PLAN
FOR THE FORMER COKE PLANT
ARCELORMITTAL INDIANA HARBOR WEST
EAST CHICAGO, INDIANA

EPA has conducted a technical review of the November 2015 Pre-Design Work Plan for the Former Coke Plant (Work Plan) at the ArcelorMittal (AM) Indiana Harbor LLC West facility in East Chicago, Indiana. This Work Plan outlines a scope of work for addressing lingering data gaps in contaminant delineation and evaluation of potential remedial alternatives for soil, groundwater, and light non-aqueous phase liquids (LNAPL). EPA's review focused on evaluating the technical adequacy of the plan and its responsiveness to related EPA comments previously provided on the Additional Site Investigation Report.

The Work Plan also includes an Expanded Screening Level Ecological Risk Assessment (Appendix B) and a Focused Human Health Risk Assessment (Appendix C). EPA comments on these components of the Work Plan are included below.

GENERAL COMMENTS

A. EPA previously requested revision of the Conceptual Site Model (CSM) to include the potential for exposures to volatile contaminants migrating from the deeper subsurface into and through the surficial fill to ambient air. The response AM provided did not indicate that the CSM will be revised in this manner, only that the vapor intrusion pathway will be considered in the event that buildings are constructed on the site in the future. EPA reiterates the need to revise the CSM accordingly. We request additional detail on how AM will formally memorialize the need for vapor intrusion evaluations prior to and during occupation of any buildings that may be constructed on the site in the future. Furthermore, the response does not document that AM has appropriately ruled out the possibility of outdoor air quality concerns from VOCs to site workers parking vehicles or performing remediation activities. EPA requires that additional discussion on this potential exposure pathway be provided, and the soil to ambient air exposure pathway be investigated during the pre-design effort. The inhalation route is not controlled/prevented by restrictive covenants. (See Figure 3 of the Additional Site Investigation Report and Figure 2-1 of Appendix C of the Pre-Design Work Plan.)

The Pre-Design Work Plan should be revised to specify that AM conduct additional sampling and analysis for VOC constituents in the overlying fill, rather than merely concluding that no current exposure pathway exists. EPA does not consider PID/FID readings as adequate to characterize the concentration of VOC contaminants in the fill material. The resulting data collected can then be compared to human health screening levels for the inhalation pathway as part of the risk assessment for the CMS.

B. In EPA's approval letter for the coke plant investigation report dated February 16, 2016, modification (c), EPA previously noted in Specific Comment 2, that logs for borings SB-880 and SB-881 suggest the presence of light non-aqueous phase liquid (LNAPL) at a depth of roughly 8 feet below ground surface. While the AM response correctly noted that the upcoming pre-design investigation will include further evaluation of the extent of LNAPL near the former benzol storage area, as shown on Figures 10 and 11 from the Pre-Design Investigation Work Plan, the proposed LNAPL investigation (including laser induced fluorescence [LIF] and monitoring well installation) does not extend far enough to the southeast to intercept the area around borings SB-880 or SB-881. Accordingly, we recommend that additional LIF borings and at least one well be advanced to ensure that any LNAPL around and down-gradient of boring SB-881 will be properly delineated during the investigation.

C. LNAPL may be a source of numerous dissolved phase contaminants in groundwater at the site. We agree with ArcelorMittal's plan to consider LNAPL removal during the CMS, but also recommend that Section 7.4 (second paragraph) of the Additional Site Investigation Report be revised to clarify that the LNAPL may be the source of numerous contaminants beyond just benzene, toluene, ethylbenzene and xylene (BTEX).

SPECIFIC COMMENTS

Section 2.3, Conceptual Site Model, page 12

1. The second paragraph in this section discusses implementation of a deed restriction on the property to ensure that future users understand site risks. The text also notes that the vapor intrusion pathway will also be evaluated in the event that buildings are constructed on the property in the future. Triggers for, and timing of, this risk evaluation should be specifically detailed in the proposed deed restriction.

Section 3.3.4, Site-Specific Hydrogeology, page 14

2. ArceorMittal contends that a low permeability silty clay layer is continuous across the site, serving as an aquitard and limiting downward vertical migration of dissolved phase contamination. To provide further support for this statement, hydrogeologic data obtained during the pre-design investigation should be incorporated into the cross-sections on Figures 4 and 5 prior to submittal of the Pre-Design Report. Two components of the proposed scope of work (e.g., the LNAPL laser-induced fluorescence in the former benzol storage area and installation of wells near MW-822D) involve advancement of borings to depths of 40 feet and should provide further confirmation as to the presence or absence of the referenced clay layer across the site.

Section 4.2.2 Former Benzol Storage Area

3. The Section describes how the extent of LNAPL, impacted soil, and impacted groundwater near the benzol storage will be further delineated. To evaluate the

extent of impacted soil within the Benzol Storage Area and down-gradient of that area, some additional soil borings are proposed (Section 4.2.2.2). A total of 18 soil samples from six additional monitoring well borings would be obtained and analyzed for target parameters (Table 6). At each of the six boring locations, one soil sample from the upper two feet will be collected to evaluate the direct contact exposure pathway by performing analysis of PAHs and metals only. The analysis of those samples is appropriate, but it should be extended to include VOCs to evaluate the potential for volatilization from shallow soils to ambient air. Consequently, the analysis of VOCs should be performed in the shallow soil samples to be collected at SB-884, SB-885, SB-887, SB-888, and SB-892.

Section 4.2.2.3, Extent of Impacted Groundwater, page 20

4. This section refers to seven monitoring wells (MW-828S through MW-833S and MW-832D) that will be installed and sampled to further evaluate groundwater quality within the former benzol storage area. Figure 11 shows eight wells to be installed in this area – those listed above, plus MW-838S. However, well MW-838S is not discussed in the text of the Pre-Design Work Plan. Expand this section to include well MW-838S, or provide clarification as to the specific purpose of this monitoring well.

Section 4.2.4, Monitoring Well MW-822 Area, pages 20 and 21

5. This section calls for installation of two monitoring wells (MW-834D and MW-835D) to further delineate the extent of arsenic and thallium in groundwater near existing well MW-822. According to Table 6, only surface soil will be sampled at these borings and only for polynuclear aromatic hydrocarbon analysis. It is unclear why surface and subsurface soil from these borings will not also be sampled for arsenic and thallium analyses in an effort to delineate the potential source area for known groundwater contamination. Provide the rationale for this limitation in analytical parameters, or expand the scope of the investigation accordingly.

Section 4.2.8, Site-Wide Surficial Soil, page 21

6. The second paragraph in this section refers to Figure 12 for identification of locations with surface soil contamination above Indiana Department of Environmental Management (IDEM) commercial/industrial direct contact screening levels. The legend for this figure indicates that these locations should be highlighted in yellow, but no highlighting is indicated in the vicinity of previous borings SB-880, SB-881, MW-822D, MW-823D, and MW-826M. Amend the figure to appropriately highlight soil exceedances in this area.

7. The last sentence in this section indicates that, should new surface soil sampling locations be found to exceed direct contact criteria, additional fill materials may be placed within the former coke plant to render that pathway incomplete. However, it

does not appear appropriate to eliminate other potential remedial option (e.g., excavation) at this time. During the corrective measures study (CMS) for this site, a variety of remedial options should be considered and evaluated based on all data obtained to date and through the pre-design field effort.

Section 4.3.1, Surfactant Enhanced Recovery, pages 22 through 25

8. On pages 23 and 24, the Work Plan proposes to conduct bench-scale testing using solutions with varying surfactant concentrations and, potentially, incorporating solvents to enhance emulsification. Discussion of field-scale testing on pages 24 and 25 calls for use of a 4% surfactant solution without added solvent. Rather than arbitrarily selecting a surfactant concentration at this time, field testing should be conducted using that surfactant/solvent solution determined to be optimal during bench-scale testing. Provide additional justification for pre-selecting the test solution at this time, or revise the Work Plan to specify the means by which an appropriate surfactant/solvent solution will be selected after bench-scale testing is complete.

9. The last two paragraphs in this section indicate that, after the field-scale injection/extraction events are completed, biological amendments will be injected into the subsurface to stimulate natural decomposition of observed hydrocarbons over a period of at least six months. The Work Plan then proposes to collect field data (e.g., LNAPL thickness, pH, dissolved oxygen, oxidation-reduction potential, specific conductivity, ammonia, nitrates, and contaminant concentrations) on a quarterly basis from well MW-820S. Given the short time frame for enhanced biodegradation testing in this location, monthly monitoring of these parameters would appear to be more appropriate. Provide additional justification for quarterly monitoring, or revise the proposed scope of work accordingly.

Section 4.4.3, Inorganic Constituents, page 32

10. The sentence on this page states that ammonia and chloride are not being carried forward as chemicals of concern for the former coke plant. However, because they are residual products from the production of coke, ammonia and chloride detections will be considered during the CMS. Clarify the text to explain how the presence or absence of these constituents will affect CMS decision-making. For example, will detections be used as evidence of contamination? Will potential remedial technologies also have to address these two constituents, as well as retained chemicals of concern?

Section 5.3.3, Surface Water Levels, page 34

11. This section refers to Figure 6 for the two locations at which surface water levels will be measured in the canal. However, these locations are actually indicated only on Figure 2. Correct the text accordingly.

Section 5.4, Groundwater Sampling, pages 34 and 35

12. Section 5.2 differentiates between screen lengths for water table wells, mid-depth wells, and deep monitoring wells. Step 6 in Section 5.4 should also differentiate between well intake positioning for the three types of wells. Revise the text accordingly.

Section 5.8, Data Validation, pages 37 and 38

13. The last paragraph in this section states that, if initial rounds of data validation demonstrate that the laboratory reliably produces data of high quality and usability, the level of data quality reporting may be reduced. While this is a potentially acceptable scenario, such a change should only be made with prior EPA approval. Revise the Work Plan to incorporate this condition.

APPENDIX B – Expanded Screening Level Ecological Risk Assessment

The conclusions of the ecological risk assessment may need to be revised based on the Specific Comments provided below.

SPECIFIC COMMENTS:

1. Page 11, Section 2.2.1: It is unclear if the individual low molecular weight (LMW) PAHs and the individual high molecular weight (HMW) PAHs were added together (a total for the LMW PAHs and a total for the HMW PAHs) to assess their cumulative risk. The text notes their common mechanism of action and states that they are "grouped together", however it is not clear if the individual risks for each type of PAH were ultimately evaluated cumulatively.

2. Page 11, Section 2.2.2: EPA does not agree with the rationale for not selecting a fish-tissue based TRV for PAH's. It is true that fish are able to metabolize PAHs, however studies have also shown that the action of metabolizing the PAHs increases the incidence of tumors including, liver neoplasia, hepatic carcinoma, and hyperplastic disease. Please revise to include a fish-tissue based TRV for PAHs.

3. Page 12, Section 2.2.2: Dyer et al. (2000), the source for fish tissue based TRVs for cadmium, copper, and selenium, is not acceptable to EPA. The study was an investigation of approaches and paradigms currently advocated for ecological risk assessment and was not conducted to develop fish tissue based TRVs. A potential source for TRVs is the 1996 Oak Ridge National Laboratory (ORNL) document which can be found at: https://rais.ornl.gov/documents/tm96r2.pdf. Please revise the risk analysis for these 3 COCs for fish.

4. Page 12, Section 2.2.3: Allometric scaling is no longer recommended by EPA in ERAs. However, since it was already applied in this instance, EPA will accept its use. Future ERAs should not use allometric scaling.

5. Page 13, Section 2.2.3: It is unclear why 1.53 mg/kg-day was chosen as the avian TRV for cadmium. The March 2005 Interim Final Eco-SSL document for cadmium lists the TRV as 1.47 mg/kg-day. In addition, the selected avian TRV for selenium is 0.09 mg/kg-day as opposed to 0.290 mg/kg-day which is the TRV listed in the July 2007 Interim Final Eco-SSL document for selenium. Please explain. Please revise the risk analysis for these 3 COCs for avian receptors.

6. Page 13, Section 2.2: EPA requests that additional references be provided for the TRV for PAHs in birds. There has been some concern that the Patton and Dieter 1980 TRV was skewed due to a lower food intake by the birds in the study due to a decrease in the palatability of the food due to the addition of the PAHs. Although the EcoSSLs did not have enough studies per their procedures to develop a TRV for PAHs in birds, the studies that were peer reviewed and approved by the EcoSSL team may serve useful for our purposes.

APPENDIX C: Focused Human Health Risk Assessment (November 2015)

Section 2.1 Conceptual Site Model (CSM)

1. Figure 2-1 is described as the CSM diagram for the Focused HHRA. However, that Figure appears to be a CSM for the entre Coke Plant Site. An explanation should be provided for which part of the Figure applies to the Focused HHRA, or alternatively, a CSM diagram for the Focused HHRA should be provided.

2. Page 5: The language at top of this page states that volatile constituents in subsurface soil and groundwater could migrate to air. The conclusion is reached that exposure to volatile constituents in ambient air or indoor can be considered incomplete because site workers are not present and their presence can be prevented by institutional controls. Please refer to the previous comment above recommending that the site-wide Conceptual Site Model Diagram should be revised to take into account potential exposure from migration of VOCs for all potential workers at the site surface of the Coke Plant, since the Inhalation Route of exposure is not controlled/prevented by restrictive covenants.

Section 2.3 Potential Human Receptor Groups and Exposure Pathways

3. Page 6: The language states that because some constituents that move from groundwater to surface are bioaccumulative, there is a potential for bioaccumulation from surface water to fish. Because the Indiana Harbor Canal itself is not expected to be a significant fishing location or to support a fishery, the conclusion is reached that consumption of fish by a recreator cannot be a complete pathway. However, migration of fish within the Canal and out to Lake Michigan may be a possibility. Please provide additional rationale for

concluding that consumption of fish which migrate in the Canal and uptake constituents cannot be complete pathway for the wider local recreational area, and therefore, that a screening level evaluation for fish consumption is not needed. Was an estimate of uptake for bioaccumulative contaminants in fish performed for the Screening Level Ecological Assessment?

Section 3.1.2 Derivation of Risk-based Concentrations (RBCs) for Groundwater Constituents

4. The identification of a recreational visitor as the likely receptor for surface water contaminants is appropriate. The exposure scenario for receptor contact with surface water regarding frequency of exposure per year and multi-year exposure events can be regarded as adequately conservative. The use of a target cancer risk of 1E-06 and a Hazard Quotient of 1 is considered conservative for the derivation of RBCs for the constituents. The calculation of RBCs employing the EPA Regional Screening Level calculator is consistent with the use of EPA Guidance (attachment 1 and Table 3-1).

Section 3.2 Estimated Surface Water Concentrations

5. To estimate surface water concentrations from discharge of constituents from starting groundwater concentrations, a series of steps was performed that were designed to prevent the underestimation of potential surface water concentrations for comparison to the Risk-Based Concentration Levels calculated in Section 3.1.2. In steps 1 through 3 of the screening, maximum detected constituent concentrations in groundwater were used as possible surrogates for actual surface water constituent concentrations. Then the surrogate concentrations were compared to the Risk-Based Concentration Levels. That methodology is adequately conservative.

6. After Step 3, four constituents remained with maximum surrogate surface water concentrations above their respective MCLs or Risk-Based Concentration Levels (i.e., benzene, arsenic, ammonia, sulfate). Consistent with previous EPA comments, Step 4 was performed by calculating the 95% Upper Confidence Limit of the Mean (95%UCL) of the groundwater data from wells proximate to the sheet pile wall and from wells which define the benzene plume. The appropriate set of 11 wells was selected for the analysis (page 8). The 95%UCL values were calculated using the EPA ProUCL software (Version 5; 2013), which is appropriate.
However, the following items should be addressed:

    a. After the Kaplan-Meier Method was used to account for non-detect concentrations, the BCA Bootstrap method value was used as the estimated 95%UCL. Provide a rationale for why the BCA Bootstrap value was selected rather than the suggested/recommended UCL value calculated by the ProUCL software.

    b. For benzene and arsenic, two or more samples were reported as "non-detect" concentrations (Table 3-1). However, the detection limit/sample quantitation limits

associated with the non-detect values was not listed. The detection limit/sample quantitation limits for those samples should be provided in order to compare those limits to the lowest detected concentration values.

7. After Step 4, only benzene remained as a constituent with a surrogate surface water concentration above its respective Risk-Based Concentration Level. In part 1 of Step 5, an additional evaluation was performed for benzene which was proposed to represent a more realistic approach for estimating a surface water concentration for benzene. In this Step, groundwater from the two deep wells (MW-808D and MW-809D) was considered as not likely to contribute to groundwater discharge to the Canal via the breach in sheet pile wall based on the depth to groundwater and their location in lower permeability silts and fine-grained sands. In the re-evaluation, the benzene data from those two wells was omitted from the benzene 95%UCL calculation. However, the refined ProUCL calculation value could not be located in the text description or in Table 3-1. The following items should be addressed:

   a. The calculated refined ProUCL value and ProUCL work sheet should be provided along with an indication of whether the calculated UCL value is above or below the Risk-Based Concentration Level for benzene.

   b. Provide the depth at which groundwater is screened in MW-808D and MW-809D and the depth to groundwater at those locations (page 9). Also, provide the references to which site groundwater studies included the determination of mean geometric hydraulic conductivity for the wells used in the HHRA report. Does the value for mean hydraulic conductivity of shallow wells apply specifically to the wells near the breach and the benzene plume, or more generally to the shallow wells across the site?

8. In part 2 of Step 5, a summary description is provided for the derivation of groundwater-to-surface water dilution factor using the estimated groundwater discharge rate from the site and the estimated surface water flow rate in the Indiana Harbor Canal. The derivation of the dilution factor is present in a *Technical Memorandum* as Attachment 3 of the Screening Level Ecological Risk Assessment. A groundwater-to-surface water dilution factor value of 3250 was derived from the evaluation. In the final step of the evaluation, the refined 95%UCL groundwater concentration for benzene from the nine wells which contribute the discharge to the Canal was divided by the derived dilution factor of 3250 to estimate an exposure point concentration for human receptor contact with surface water in the Canal. The resulting exposure point concentration of 4.8 microgram/Liter is less than the MCL for benzene (5 ug/L) and the scenario-specific Risk-Based Concentration for benzene (281 ug/L; APPENDIX C; Attachment 1). Based on those results, it was concluded that the discharge of benzene to the Canal would not result in any significant human health risk.

For the purpose of transparency and to support the conclusion reached in the Focused HHRA, the following items should be addressed:

a. Provide an explanation for how groundwater-to-surface water dilution factor estimates are typically conducted, including reference to any specific guidance for conducting such estimates (e.g., EPA, ITRC, Indiana Department of Environmental Management).

b. Provide a clarification on whether the dilution factor derivation in the *Technical Memorandum* is equivalent to a "mixing zone" derivation, or how the two derivations differ.

c. Provide an explanation of where the exposure point concentration for benzene is assumed to be located in the Canal after dilution (e.g., at the breach sheet in pile wall; at the outlet of the Canal to Indiana Harbor; at the outlet of the Harbor to Lake Michigan?).

Attachment 3. Technical Memorandum: Estimated Groundwater Discharge to Surface Water Dilution Factor.

The use of no greater than 25% of the stream design flow is provided for in the Indiana regulations (327 IAC 5-2-11.4) when deriving dilution fractions (not factors) for constituent concentration comparison against chronic ecological criteria. The stream design flow is defined as the seven day, ten year low flow as specified at Section 11.4(b)(3)(A). Considerations for acute toxicity (in the same section of the regulations) specify that the stream design flow to be used is the one (1) day, ten (10) year low flow. It is not clear how the flows specified in Attachment 3 relate to the stream design flows specified in the Indiana rules. Please explain, and if necessary, revise the calculations.

Notwithstanding the above, the calculations themselves appear to be conservative and biased toward a higher groundwater discharge volume and, consequently, a smaller dilution fraction. For example, the length of the breached sheet pile area accounts for the entire length of the wall, even where it runs parallel to the direction of groundwater flow and would presumably be subject to reduced discharge. Although very conservative, this assumption appears to be relatively reasonable and supportable.

The calculations also assume that a certain amount of groundwater leaks through the sheet pile revetments. Rather than use the modeled hydraulic conductivity of the sheet pile (0.0014 feet per day), the contractor assumes that conductivity of the sheet pile wall is approximately 10% of the hydraulic conductivity of the aquifer sands through which discharge occurs in the breached area (8.8 feet per day). The memo provides no justification for this relatively high hydraulic conductivity value for the sheet pile wall. Please explain, and if necessary, revise the calculations.

327 IAC 5-2-11.4(a)(13) specifies how ammonia, chloride and metals dependent upon hardness shall be handled with respect to dilution. It is not clear that the calculations in Attachment 3 are consistent with the applicable regulations. Please explain, and if necessary, revise the calculations.